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Nuclear structure of neutron-deficient Se and Kr isotopes

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To investigate the microscopic configurations causing the prolate-oblate-triaxial shape transition near A = 72 and their possible influence on octupole as well as hexadecapole collectivity, we studied the rare isotopes 74,76Kr and 72Se, as well as stable 74Se via (p, p′) and (p, 2p) reactions in inverse kinematics with GRETINA, the S800, and the NSCL-Ursinus LH2 target [1, 2, 3]. Our work established two regions of distinct electric octupole (E3) transition strengths with an intriguing strength increase at the A = 72
shape-transitional point, which is not yet understood. Additionally, we linked the enhanced electric hexadecapole (E4) transition strength in 74,76Kr to the well deformed
prolate configuration comparing to state-of-the-art nuclear density functional theory calculations [2]. In Ref. [3], we showed that l = 1, 2, 3, and 4 angular momentum transfers are important to understand the population of excited states of 72,74Se in proton removal. A comparison to (d, 3He) data available for stable odd-A nuclei supports that the bulk of the spectroscopic strengths could be found at lower energies in the even-even Se isotopes than in the even-even Ge isotopes around N = 40.

This presentation will discuss these recent results and provide an outlook for further studies at the Facility for Rare Isotope Beams.

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